PATENT SPECIFICATION

643,666

Date of Application and filing Complete Specification: Feb. 28, 1947.

No. 5888/47.

Complete Specification Published: Sept. 27, 1950.

Index at acceptance:—**Classes 2(v)**, R3c(4: 6: 7: 8: 9: 15), R4a, R4c(6: 9: 13), R14c(4: 6: 7: 8: 9: 15); **70**, E16, F5x; **and 140**, A2(c: d: x).

COMPLETE SPECIFICATION

PATENTS ACT, 1949

SPECIFICATION NO. 643666

In accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated the fourteenth day of February, 1952, this specification has been amended under Section 29 in the following manner:-

Page 4, line 66 *after* "naphthylamine ..." *insert* "3.207"

THE PATENT OFFICE,
17th March, 1952

DS 11165/1(8)/5299 100 3/52 R

[illegible] method of making the same.

In textile spinning machines comprising fiber drafting mechanism, an endless belt or band is used as a conveyor to carry the fibers along during the drafting stage.

In modern drafting machinery, the so-called long draft method is employed. In the Casablanca system, two aprons run together. At one end the aprons go over rotating arbors or rolls while, at the other end, they pass over fixed metal bars. In view of their cushioning and frictional power, the two aprons act as holding media and regulate the feed to the front drafting rolls of the machine.

In the Casablanca system, the two arbors, over which the spinning aprons pass, are dissimilar in that one is the driven roll while the other generally has a knurled surface and is the driving roll. The knurled surface cuts into the inner surface of the apron passing thereover, and the outer surface of this apron engages the outer surface of the other apron, passing over the smooth-surfaced roll and causes the movement thereof. As has been pointed out above, the aprons are rubbed constantly over rigid metal bars. Therefore, a satisfactory apron does not exhibit any tendency to heat, chafe or bind, in passing over the fixed metal bars.

When the various types of drafting systems were developed, leather was the apron. More recently, special types of rubber composition have been devised and long spinning aprons made with such improved rubber composition. But also, spinning aprons made with such rubber compositions have not fully overcome the drawbacks encountered heretofore with spinning aprons.

According to the present invention there is provided a draft apron for textile machinery, characterized by a body of rubber-like material having a fiber working surface arranged for engagement with the material to be drafted and adapted yieldingly to accommodate and embrace the material to be drafted, said body having completely embedded therein a plurality of longitudinally substantially inextensible textile cords or fibers arranged substantially parallel to the longitudinal axis of the apron and spaced from the fiber working surface by a distance at least equalling the distance between the fiber working surface and the neutral axis of the apron, and adapted to press the yielding body of rubber-like material onto the material being drafted to place it under compression and yieldingly engage it and move it by traction with the minimum of slippage.

According to the invention there is also provided a draft apron for textile machinery, which comprises a body of rubber-like material having a fiber work-

[*Price*

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COMPLETE SPECIFICATION

Improvements in and relating to Aprons for Textile Machinery

We, THE DAYTON RUBBER MANUFACTURING COMPANY, a Corporation duly organised under the laws of the State of Ohio, of Dayton, Montgomery County, Ohio, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to textile drafting machinery and, more particularly, deals with spinning aprons and a method of making the same.

In textile spinning machines comprising fiber drafting mechanism, an endless belt or band is used as a conveyor to carry the fibers along during the drafting stage.

In modern drafting machinery, the so-called long draft method is employed. In the Casablanca system, two aprons run together. At one end the aprons go over rotating arbors or rolls while, at the other end, they pass over fixed metal bars. In view of their cushioning and frictional power, the two aprons act as holding media and regulate the feed to the front drafting rolls of the machine.

In the Casablanca system, the two arbors, over which the spinning aprons pass, are dissimilar in that one is the driven roll while the other generally has a knurled surface and is the driving roll. The knurled surface cuts into the inner surface of the apron passing thereover, and the outer surface of this apron engages the outer surface of the other apron, passing over the smooth-surfaced roll and causes the movement thereof. As has been pointed out above, the aprons are rubbed constantly over rigid metal bars. Therefore, a satisfactory apron does not exhibit any tendency to heat, chafe or bind, in passing over the fixed metal bars.

When the various types of drafting systems were developed, leather was the only material available for aprons. The service was so severe that only specially processed leather could be employed, and even this leather failed to give complete satisfaction so that for some time there was a definite need for a better type of apron.

Aprons of rubber composition have been introduced in recent years as substitutes for the orthodox leather apron. While these rubber aprons offer some advantages, they have failed to overcome many of the disadvantages of the earlier leather apron. More recently, special types of rubber composition have been devised and long spinning aprons made with such improved rubber composition. But also, spinning aprons made with such rubber compositions have not fully overcome the drawbacks encountered heretofore with spinning aprons.

According to the present invention there is provided a draft apron for textile machinery, characterized by a body of rubber-like material having a fiber working surface arranged for engagement with the material to be drafted and adapted yieldingly to accommodate and embrace the material to be drafted, said body having completely embedded therein a plurality of longitudinally substantially inextensible textile cords or fibers arranged substantially parallel to the longitudinal axis of the apron and spaced from the fiber working surface by a distance at least equalling the distance between the fiber working surface and the neutral axis of the apron, and adapted to press the yielding body of rubber-like material onto the material being drafted to place it under compression and yieldingly engage it and move it by traction with the minimum of slippage.

According to the invention there is also provided a draft apron for textile machinery, which comprises a body of rubber-like material having a fiber work-

[Price

ing surface arranged for engagement with the material to be drafted and adapted yieldingly to accommodate and embrace the material to be drafted, said body having completely embedded therein a plurality of longitudinally substantially inextensible textile cords or fibers arranged substantially parallel to the longitudinal axis of the apron and between the neutral axis of the apron and that surface thereof which is located opposite the fiber-working surface, whereby the material being drafted is yieldingly pressed by said body of rubber-like material so as to be under compression and moved by traction with a minimum of slippage.

The invention also covers a method of making an apron for textile machinery, which includes the steps of depositing a layer of rubber-like material on the surface of a cylinder or mandrel, placing thereover a layer of longitudinally extending substantially inextensible cords or fibers, arranged substantially parallel to the longitudinal axis of the apron and spaced from the fiber-working surface by a distance at least equalling the distance between the fiber-working surface and the neutral axis of the apron, superimposing thereon a layer of rubber-like material, and vulcanizing the built-up body.

In the co-pending Application No. 36513/46 (Serial No. 641,941) there is described and claimed an apron for use in connection with textile machinery, in which a layer of longitudinally arranged fiber cords is interposed between a fiber contacting layer of a rubber composition and a roller contacting layer of a rubber composition, said roller contacting layer including a tough black rubber composition containing carbon black filler, and said fiber contacting layer including a soft rubber composition free from carbon black.

The present invention is illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view of a typical Casablanca type drafting system showing the two aprons in position.

Figure 2 is a cross section taken along the line 2—2 of Figure 4.

Figure 3 is a cross sectional view taken along the line 3—3 of Figure 1.

Figure 4 is a diagrammatic view illustrating the method of making one form of spinning apron according to the invention.

Figure 5 illustrates a modified form of a spinning apron according to the invention and represents a section along the line 5—5 of Figure 6.

Figure 6 is a diagrammatic view illustrating a method of making another form of spinning apron following the principle of the present invention.

Figure 7 is a cross sectional view of a spinning apron made according to the method illustrated in Figure 6.

Figure 8 is a further modification of the invention.

Figure 9 is a diagrammatic view of a Saco-Lowell type drafting system showing a single spinning apron in position.

Referring now to the drawings in detail, and Figure 1 in particular, the structure shown therein illustrates a typical Casablanca system with the driving roll 10 having a knurled surface and the driven roll 11 having a smooth surface. Passing over the roll 11 is the spinning apron 14 which also passes over the fixed metal bar 12. Similarly, the spinning apron 15 passes over the knurled roll 10 and over the fixed bar 13. The make-up of the aprons 14 and 15 can be seen best from Figures 2 and 3. As will be seen from these figures, the apron is composed of a layer 17 of rubber-like material and provided with a fiber working surface 16. Embedded in the layer 17 are textile cords or fibers 18 which are substantially inextensible in the longitudinal direction thereof. According to Figure 3, the two spinning aprons 14 and 14 are shown drafting a fiber 19 between the working surfaces 16. It will be noted that the cords 18 lie remote from the working surfaces. It will also be noted that, where the fibers "bunch," as at 19^1, the reinforcing cords separate, as at 18^1, thereby permitting the rubber composition forming the body of the apron to adjust itself to the increased thickness of the fiber layer being drafted.

The manner in which the spinning apron shown in Figure 2 is produced is illustrated in Figure 4. On the surface of the rotating cylinder 20 is deposited a thin film or layer of synthetic rubber composition or synthetic resin, whereupon a winding of cord is placed around said synthetic rubber or said synthetic resin composition. After the cord has thus been applied, a second film or layer of rubber composition or synthetic resin is placed thereover so that the cords become thoroughly covered and impregnated with the synthetic rubber or synthetic resin composition. Finally, a heavier layer of synthetic rubber or synthetic resin composition is applied and the whole is vulcanized to provide a unitary spinning apron member comprising synthetic rubber or synthetic resin composition reinforced with longitudinally substantially inextensible textile cord or fiber in which the cord or fiber layer lies remote from the working surface of the apron.

The application of the thin film or layer of synthetic rubber or synthetic resin composition beneath and above the cord layer to impregnate the cord may be carried out in any desirable or advantageous manner. For example, it is possible to spray the films or layers on the surface of the roll 20. It is also possible to form a thin tube by extrusion to apply as a sleeve over the roll 20, to apply the cord layer thereover, and then to continue the operation. This method, however, is not quite advantageous when the thickness of the layer beneath the cord is to be small.

Figure 5 illustrates a spinning apron in which the cord or fiber layer lies substantially in the central portion of the body of the apron. The working surface of this type of apron is again designated 16 while the reference character 18 designates the cord, and the reference numeral 21 designates the inner or roll side surface of the apron.

The spinning apron according to Figure 5 may be made as illustrated in Figure 6. Since the thickness of the under layer of synthetic rubber or synthetic resin composition is relatively thicker than in the spinning apron illustrated in Figure 2, it proves more advantageous in this instance to form the previously mentioned tube of synthetic rubber or synthetic resin composition by extrusion and to place it as a sleeve over the surface of the cylinder 20. However, a spraying method could be used with equal satisfaction, if such method should be preferred.

Assuming that the method to be employed involves the use of a tube or extruded member, such tube is placed over the cylinder 20 whereupon the cord layer is placed thereover, and a second layer of synthetic rubber or synthetic resin composition is deposited over the cord layer. The built-up body is then vulcanized to produce a unitary structure in which the cord layer lies substantially in the center of the structure. The finished product is illustrated in Figure 7.

In some cases it is desirable to have a spinning apron which is not only longitudinally, but also laterally, substantially inextensible. To obtain such an apron according to the present invention, in addition to providing the longitudinally arranged fibers in the upper layer, the lower portion of the spinning apron is made of a synthetic rubber or synthetic resin composition reinforced with fine textile fibers 22 lying substantially parallel to each other and transverse to the longitudinal axis of the spinning apron. A cross sectional view of such a spinning apron is shown in Figure 8.

The type of construction illustrated in Figure 8 is of great importance since the spinning apron will not exhibit any circumferential stretch while at the same time retaining its shape laterally which is of particular advantage in connection with the thinner gauges. When aprons of thin gauge are employed which do not include this lateral reinforcement, they exhibit a tendency to stretch laterally and to curl, thereby distorting along the edges. When there is lateral stretch, the width of the apron increases, and this causes the apron to climb the flanged edges of the idler rolls which are used in some types of drafting machinery and to become permanently distorted.

It is of course understood that the present invention is not limited to the Casablanca system but is of great advantage also in connection with other types of textile working machinery such as the "Saco-Lowell," the "Whitin," the "Roth" and others. Figure 9 illustrates one such other type of drafting system.

It will also be understood that in the manufacture of spinning aprons, according to the invention, the surface of the built-up vulcanized body must be smoothed down by abrading or otherwise to provide a perfectly smooth surface free from burrs and projections but without a high polish or shine. In other words, it is desirable to have a body which is uniform in outside diameter and which possesses a slightly rough but uniform surface. Obviously, the built-up body is cut up into several aprons of the desired width by any appropriate means such as by mounting the cylinder 20 on a lathe and applying a cutting knife or knives.

The spinning aprons according to the invention exhibit considerable flexibility and possess a high co-efficient of friction. Other features of an apron according to the invention consist in favorable aging properties such as maintenance of their thickness, resistance to cracking, substantial freedom from static, resistance to oil and abrasives, stability of length and width, and freedom from deformation or tackiness when subjected to the temperature and humidity present in drafting operations.

In order to obtain the above-mentioned desirable characteristics, it has been found that certain types of synthetic rubber and synthetic resin compositions are especially well adapted. The following are examples of the synthetic rubber and synthetic resin type compositions which may be used, but it will be understood that the invention is not intended to be limited to the use of these special compositions.

COMPOSITION I.

Using Neoprene.

	Parts by weight
Neoprene Type G (polymerized chloroprene)	100
Zinc Oxide	10
Light Magnesium Oxide	10
Cumar (Registered Trade Mark)	2
Whiting	20
Cotton Seed Oil	5

Vulcanizing: 30 minutes at approximately 300° F. steam cure.

COMPOSITION II.

Using Perbunan.

	Parts by weight
Perbunan (Registered Trade Mark) (butadiene - acrylic nitrile copolymer)	100
Zinc Oxide	5
Sulfur	2
Altax (Registered Trade Mark) (Benzothiazyl disulfide)	1
Whiting	30
Mineral Oil	10

Vulcanizing: 30 minutes at approximately 300° F. steam cure.

COMPOSITION III.

Using Thiokol.

	Parts by weight
Thiokol (Registered Trade Mark) Type F (olefine polysulfide resin)	100
Zinc Oxide	2
Diphenyl Guanidine	.10
Altax	.25
Whiting	20
Stearic Acid	.50

Vulcanizing: 30 minutes at approximately 300° F. steam cure.

COMPOSITION IV.

Using Flexible Glyptal.

	Parts by weight
Soft Glyptal (Registered Trade Mark) Resin (General Electric 1353 U Resin)	89
*Neoprene Binder	10
Flexible Bakelite (Registered Trade Mark) Resin	1

Vulcanizing: 120 minutes at approximately 300° F. dry heat.

*The Neoprene Binder mentioned in the immediately above formula is preferably composed of the following materials:—

	Parts by weight
Neoprene Type E	60.3
Litharge	10.07
Sulfur	.603
Wood Rosin	3.15
Neozone (Registered Trade Mark) "D" (Phenylbeta-naphthylamine)	
Zinc Oxide	6.03
Cumar	8.32
Medium Oil	8.32

When an apron such as illustrated in Figure 8 is desired, the fiber-reinforced portion thereof may be compounded according to any of the Compositions I to IV above set forth with the addition thereto of approximately 30 parts by weight of cotton fibers or other suitable fibrous material in finely divided form.

It is of course understood that the present invention is by no means limited to the specific modifications showing in the drawing but also comprises any modifications within the scope of the appended claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A draft apron for textile machinery, characterized by a body of rubber-like material having a fiber working surface arranged for engagement with the material to be drafted and adapted yieldingly to accommodate and embrace the material to be drafted, said body having completely embedded therein a plurality of longitudinally substantially inextensible textile cords or fibers arranged substantially parallel to the longitudinal axis of the apron and spaced from the fiber working surface by a distance at least equalling the distance between the fiber working surface and the neutral axis of the apron, and adapted to press the yielding body of rubber-like material on to the material being drafted to place it under compression and yieldingly engage it and move it by traction with the minimum of slippage.

2. An apron for textile machinery, which comprises a body of rubber-like material arranged for engagement with the material to be drafted and adapted yieldingly to accommodate and embrace the material to be drafted, said body having completely embedded therein a plurality of longitudinally substantially

inextensible textile cords or fibers arranged substantially parallel to the longitudinal axis of the apron and between the neutral axis of the apron and that surface thereof which is located opposite the fiber working surface, whereby the material being drafted is yieldingly pressed by said body of rubber-like material so as to be pressed under compression and moved by traction with the minimum of slippage.

3. An apron according to Claim 1 or 2, characterized in that the textile cords or fibers are substantially equidistantly spaced from each other.

4. An apron according to any of Claims 1 to 3, characterized by fine textile fibers embedded in the body of the rubber-like material and arranged substantially parallel to each other and transverse to the longitudinal axis of the apron, thereby preventing not only longitudinal, but also lateral, stretch of the apron.

5. An apron according to any of Claims 1 to 4, characterized in that the draft apron comprises a synthetic rubber or synthetic resin composition.

6. An apron according to any of Claims 1 to 5, characterized in that the rubber-like material comprises an acrylic nitrile butadiene copolymer.

7. An apron according to any of Claims 1 to 5, characterized in that the rubber-like material comprises an olefinic polysulfide resin.

8. An apron according to any of Claims 1 to 5, characterized in that the rubber-like material includes a polymerized chloroprene.

9. An apron according to any of Claims 1 to 5, characterized in that the rubber-like material includes a soft glyptal resin.

10. A method of making an apron for textile machinery, which includes the steps of depositing a layer of rubber-like material on the surface of a cylinder or mandrel, placing thereover a layer of longitudinally extending substantially inextensible cords or fibers arranged substantially parallel to the longitudinal axis of the apron and spaced from the fiber-working surface by a distance at least equalling the distance between the fiber-working surface and the neutral axis of the apron, superimposing thereon a layer of rubber-like material, and vulcanizing the built-up body.

11. A method of making aprons according to Claim 10, characterized in that the built-up body is ground or abraded following the vulcanization thereof to produce a proper working surface.

12. A method according to Claim 10 or 11, characterized in that it includes the step of placing a second layer of substantially inextensible fibers over the rubber-like material on the surface of the cylinder or mandrel, the fibers of said second layer extending substantially transverse to the fibers or cords of the first layer.

13. An apron for textile machinery substantially as hereinbefore described with reference to the accompanying drawings.

14. A method of making aprons for textile machinery substantially as hereinbefore described.

Dated this 28th day of February, 1947.

For: THE DAYTON RUBBER MANUFACTURING COMPANY,
Stevens, Langner, Parry & Rollinson,
Chartered Patent Agents,
5—9, Quality Court, Chancery Lane,
London, W.C.2,
and at
120, East 41st Street, New York, 17,
New York, U.S.A.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1950.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 2s. 0d. each (inland) 2s. 1d. (abroad) may be obtained.

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1

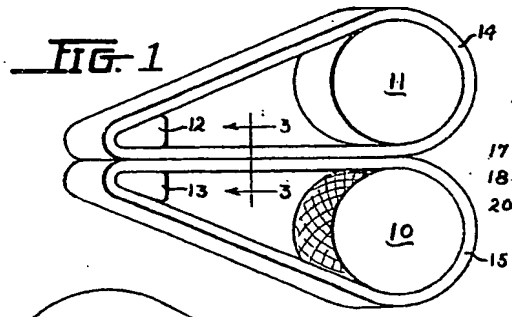
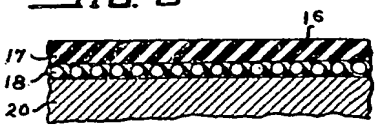


FIG. 2



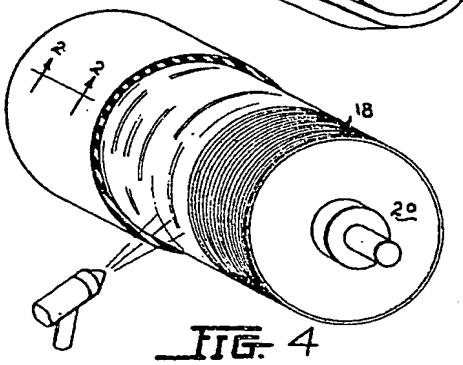


FIG. 4

FIG. 3

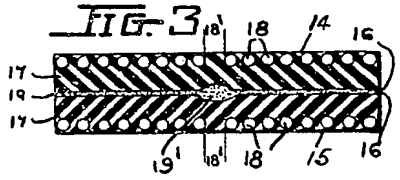


FIG. 5

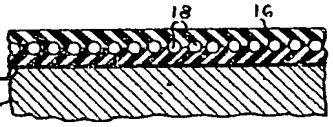


FIG. 6

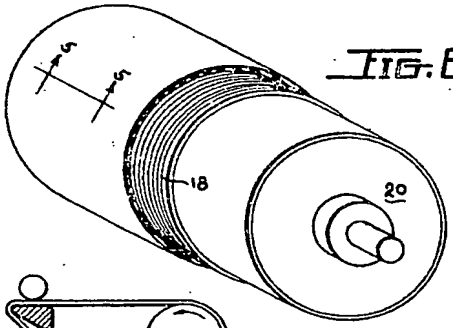


FIG. 7

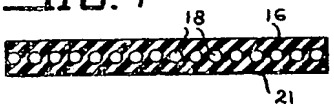
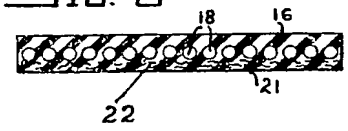


FIG. 8



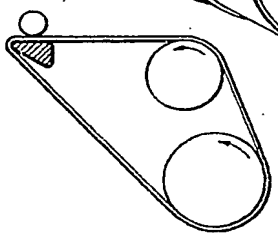


FIG. 9